

microscopes must read with such precision that a single determination of each division will suffice. The greatest improvement in this direction would be made by the introduction of glass circles which have lately been proposed by several American physicists. The practicability of this innovation can, however, only be determined by experiment. Without pretending to decide, at present, whether glass or metal will prove to be the best material, I do feel that astronomers ought not to rest satisfied with a degree of accuracy so far behind that reached by the working physicists, who cut one or two thousand divisions to the millimeter, and space them so evenly that their inequalities defy direct measurement.

In the Strassburg circle an innovation has been made, designed to render unnecessary the determination of more than a limited number of division errors. One of the circles is divided only to every degree, and four of these degrees, distant 90 degrees from each other, are divided to every two minutes. Thus there are in all 480 divisions on the circle, and the errors of these can be determined with great precision without an inordinate expenditure of labor. With the circle thus divided an arc of any required length can be measured, one of whose termini shall lie in the degree which is finely divided, and the other on one of the entire degrees. To do this it is necessary to adjust the circle on the axis with each observation in such way that that observation shall be made upon the finely divided part, while the nadir or horizontal point shall fall upon an entire degree. The latter point must then be separately determined for each astronomical observation. I cannot think but that the labor of doing this exceeds the advantage gained by it.

MERCURY BASIN FOR NADIR POINT.

I found at Strassburg, Leyden, and other continental observatories, a plan of mercury basin which works so perfectly that I am surprised at its being almost unknown outside of Germany. At every observatory, in or near a great city, observations of the nadir point and of stars by reflection are rendered difficult by the tremors produced by wind, the passing of carriages, and the movement of men or animals in the neighborhood. Various ingenious and complicated contrivances are in use for avoiding this difficulty, none of which are entirely satisfactory. The use of a copper basin to hold the mercury was proposed in Germany early in the present century, but the conditions necessary to render such a basin successful seem never to have become well un-